

AD-A097 617

ROYAL AIRCRAFT ESTABLISHMENT FARNBOROUGH (ENGLAND)

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SWEDISH DEFENCE RESEARCH ABSTRACTS 79/80-4 (FROE FOERSVARS FORS--ETC(U)

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by

National Defence Research Institute, Stockholm

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UDC 355.45(485) : 001.5 : 014.3

12) DRIC 19) FR-77767

13) 124

ROYAL AIRCRAFT ESTABLISHMENT on For

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RA&I
DRIC T38
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Justification

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FROM FORSVARS FORSKNINGS REFERAT 79/80-41

22) Trans. of report from
National Defence Research Institute, Stockholm

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Translation editor
M.G.B. Weedon

Translator

D.P. Barrett

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No dominant mutations were observed, nor any dominance effect from the induced recessive lethal equivalents. The risks of radiation during intrauterine development are discussed.

B PROTECTION - BIOLOGICAL

B2 Protective measures

(163) FOA Report B 40113-B2

Morphological and chemical characteristics of a *Cytophaga* sp. grown under conditions of magnesium excess and magnesium limitation (in English)
Ake Bovallius July 1980

A cytophage bacterium, when grown under conditions of Mg^{2+} limitation, produces a factor which releases cholinesterase from plaice muscle. A period in which rapid production of this factor occurs begins soon after the start of magnesium limitation. Modifications to the morphology, ATP content and the coarse chemical composition of the bacteria also occur during this period. The content of protein and carbohydrate increases by respectively 60% and 100%, while that of RNA and ATP decrease to respectively 70% and 40%. An increased quantity of carbohydrate is found extra-cellularly under these conditions of culture, and it can be at least partly correlated in time with the occurrence of extra-cellular mucus, which was observed under the electron microscope.

B3 Injuries and treatment - biological

(164) FOA Report B 40112-B3

Quantification of immunological reactions by luminescence (in English)
T. Olsson and others June 1980

Immune reactions can be quantified by luminescence analysis if one of the reacting components is active in a luminescence reaction. In a model system a commercial conjugate, based on horseradish (*Armoracia*) peroxidase bound to goat anti-rabbit immunoglobulin G, was used to quantify the antibodies and antigens in what is termed a solid-phase immunoassay. Protohaemin, as found in the peroxidase molecule, catalyses the light-emitting luminol reaction. Rabbit antibodies directed against serum albumin, and also serum albumin as such, could be measured in this system, using the peroxidase-catalysed luminol reaction, with a sensitivity comparable with that obtained in conventional systems based on measurements of enzyme activity in an antibody-enzyme conjugate. Luminescence analysis was also found to have a wider measuring interval and better reproducibility from one day to the next.

Attempts were also made to couple firefly luciferase with immuno-active antibodies purified from sheep serum by various coupling methods, and the products thus obtained were characterised partly with respect to their luminescent and immunological activity.

The model studies indicate that luminescence measurements of immunological reactions might be developed into sensitive and precise methods of immunological analysis.

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C PROTECTION - CHEMICALCI Threat scenario

(165) FOA Report B 40107-CI

Cardiac puncture in the mouse through the anterior thoracic aperture

(in English)

Lars Frankenberg

May 1980

The puncture is made under anaesthesia by ether, and usually yields 0.6 to 0.8 ml of blood during 10-15 s. Blood volumes of up to 1 ml have been obtained on several occasions from adult mice by this method.

A number of different methods have been described for taking blood samples from mice: puncture of the orbital plexus (Stone, 1954); amputation of the tail and suction of the blood (Ambrus *et al.*, 1951); dissection and incision of arteria femoralis, arteria carotis or vena jugularis (Ambrus *et al.*, 1951); dissection and incision of the abdominal aorta (Trice, 1954) as previously described for the rat (Lushbough and Moline, 1961) and cardiac puncture through the thoracic wall. Cardiac puncture is a good method when it is required to obtain rapidly a large volume of blood, e.g. in studying the distribution of certain substances. The present article describes a new and more reliable method of cardiac puncture in the mouse, the cannula being introduced through the anterior thoracic aperture.

Offprint from Laboratoris Animalis (1979), 13, 311-312.

D ARMAMENT AND WEAPON TECHNOLOGY

(166) CTH-A-6B 1979:8

Explosive accident at Tagene, Göteborg, 21 June 1976. Damage at a distance
Kari Wallin

On 21 June 1976 a serious explosive accident took place 8 km NNE of the centre of Göteborg, in the Hisingen at the AB Sabema macadam works in Tagene. During loading from two storage containers, 8.5 tons of explosive detonated causing serious results in the neighbourhood, with two killed, one missing and five injured. Also damaged were several houses, machinery, sheds and the bark was stripped from the nearby wood.

At the instance of the Defence Research Institute the Department of House-building at the CTH studied and analysed the damage inflicted at a distance after the accident. Damage to buildings was caused as far as 6 km from the site of the incident.

The built-up area nearest to the site of the incident is an industrial estate. Here extensive damage was caused to exterior-frame walls, gates, windows and exterior wall cladding. Serious damage was also caused to buildings in a district (Södra Kärra) 1-2 km north of the explosion. In Norra Kärra and Hjällbo 2-3 km from the explosion there was widespread breakage of glass. Besides window glass, the lighter sections of buildings were damaged in an industrial area east of Kungälvsleden. Fairly extensive glass breakage occurred in the areas of Agnesberg, Hammarkullen and Kortedala, lying within a 5 km radius of the explosion centre.

The report discusses 335 cases of damage due to the incident, which represent somewhat more than half of the damage recorded by the insurance companies. Their overall

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cost amounts to about 8M kronor. The extent of the damage with respect to the number of dwellings in different directions is not uniform. The reason is largely meteorological.

It appears from the report that it would be desirable to direct and thereby control an explosion in safe directions, and to vary the shielding distance.

To sum up, the report gives a broad perspective of the problems which may arise in an incident of this type.

D1 Technology of explosives

- (167) FOA Report C 20350-D1
Experience in the manufacture of propellant for base-flux charges for the 105mm shell M 40/74
Torsten Liljegren

April 1980

At the instance of the FFV, the FOA has manufactured propellant for base-flux charges for the 105mm shell M 40/74. This was a HTPB propellant containing 80% of ammonium perchlorate. An account is given of the composition, strength properties of the propellant, and of experience gained in its manufacture.

- (168) FOA Report C 20360-D1
Plastic-bonded explosive. I A review of the literature
Hugo Berg

June 1980

An account is given, derived from published references, of methods of manufacture, composition, testing and applications of various types of plastic-bonded explosive.

D4 Technical aspects of warheads

- (169) FOA Report C 20356-D4
Impact-ballistic investigation of light automatic carbines FNC and FFV 890 using FFV 890 ammunition (development version)
Bo Janzon

May 1980

The report contains a brief impact-ballistic investigation of a development version of FFV 890 ammunition manufactured by the FFV.

Tests were performed at a true range of 100 m by firing at targets of soap intended to simulate human tissue, measuring 200 × 200 × 270 mm. The penetration pattern was recorded by a stereoscopic arrangement incorporating eleven X-ray flash tubes.

Results show a pronounced difference between the performance of the ammunition when fired from the two different weapons. However the difference can be accounted for by differences in the calibre of the barrels of each weapon, amounting to 0.02 mm. This was chiefly important for the external ballistic performance of the projectiles, which in turn governed their final ballistics.

The results are compared with the Ak 4 using sk ptr 10 prj ammunition.

The experiments were conducted at the instance of FMV-A.

D8 System studies

- (170) FOA Report C 20351-D8
Programmer's manual for the MENU DIALOGUE SYSTEM program package
Lars-Åke Larsson

April 1980

The way in which the dialogue between a computer and a human is designed is of great importance for the extent to which an inexperienced computer user succeeds in handling large and complicated programs from a data terminal. In such situations the

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The *MENU DIALOGUE SYSTEM* is a general program package for handling menu dialogues and auxiliary texts. As a rule it can be combined with any application program written in the *KOM*... programming language. The *MENU DIALOGUE SYSTEM* supports menu-handling, interpretation of commands and the handling of auxiliary texts. The design of the dialogue is adapted to the form employed in the *KOM* conference system.

A demonstration program is available on the *DEC-10* system at the Stockholm Computer Centre (gö). The program can be started with the command *.SI F11.MNU*.

The *MENU DIALOGUE SYSTEM* is based on dialogue routines from the *.SI* system, developed for the needs of the Defence departments for computer support in budgeting activities.

(171) FOA Report C 20359-D8, (E2, E3)
Test of a position-finding system based on HI-FIX/6
Sven Medig June 1980

As part of a procurement process for position-finding equipment, FOA has conducted trials with a prototype system assembled mainly by Decca Survey Ltd and based on the Decca HI-FIX/6 system.

Position-finding was performed partly on about 20 short sections of road in order to determine the effect of some possible sources of interference such as hills, weeds, lakes, power lines, buildings or other vehicles, and partly over three long sections of road in order to discover the effect of external interference, e.g. through static buildings. These determinations were compared with plots made with a geodimeter or from aerial photographs (final result).

Analysis of the results shows that positional error for the possible sources of interference (apart from power lines) was acceptable: level ground 5 m, broken ground 15 m. Neither weed nor vehicles affected the fixes.

Another type of error is what is termed lane-jumping, which means one or more systematic errors in position. Lane-jumping occurred when passing under overhead power lines, though not always. According to Decca, errors due to lane-jumping can be automatically corrected in the HI-FIX/6 system. However this function was not employed in the tests. In advance of a demonstration of this function a proposal for procurement cannot be submitted.

E CONDUCT OF WAR - INFORMATION AND COMMAND TECHNIQUES

E1 Reconnaissance, target location and fire control

(172) FOA Report B 30035-E1, E3
Meteorological influence on aerosol extinction in the 0.2 to 40.0 μ m wavelength range (in English)
Bertil Nilsson

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(172) FOA Report B 30035-E1, E3
Meteorological influence on aerosol extinction in the 0.2 to 40.0 μ m wavelength range (in English)
Bertil Nilsson

Aerosol extinction under different weather situations was calculated by Mie theory, using an aerosol model based on dry particles. The size distribution of particles and their refractive index were matched to the actual atmospheric humidity by means of a build-up factor r/r_0 , which is a function of relative humidity.

The report shows that particle concentration in different size ranges has a dominant effect on the relation between aerosol transmission in the IR band and meteorological visibility. Variations in atmospheric humidity affect aerosol extinction for the most part through modification of the size distribution, and to a lesser extent by variation of the refractive index.

FOA Reprints 1979/80:19.

- (173) FOA Report B 30036-E1
 A data structure for a raster map database (in English)
 Roger L.I. Cederberg

An increasing demand for geographical information in the public, private and military sectors has stimulated progress with regard to the automatic collection, storage, analysis and display of geographical databases. A large part of the costs of these systems can be attributed to the digitalisation and coding of the input data. A method is suggested for the storage of binary original data. This method affords high storage efficiency, and data can be accessed in both the raster and vector modes.

Delivered at the Fourth International Symposium on Computer-assisted Cartography, 4-8 November 1979, Reston, Virginia, USA.

FOA Reprints 1979/80:23.

- (174) FOA Report C 30181-E1
 Noise and leakage signals in microwave frequency mixers for Doppler radars February 1980
 Herbert Steyskal

The report describes a simple mathematical method for obtaining quantitative expressions for the amplitudes of the principal IF products which occur when several signals are mixed in a microwave frequency mixer. It is assumed that both the local oscillators and the interference signals generate noise. The method of calculation is applied to several examples, including simple and balanced mixers with square-law or linear detectors.

- (175) FOA Report C 30182-E1, E3
 Investigations of the meteorological influence on aerosol transmission in the 0.5 to 14.0 μ m wavelength range (in English)
 Arne Hågård *et al* April 1980

Aerosol extinction is calculated in a theoretical model based on Mie theory and proceeding from the size distribution and refractive index of the aerosol particles, these in turn being related to the meteorological parameters such as the type of air mass, humidity and meteorological visibility. Calculations with the model demonstrate that there is a pronounced influence of the weather on aerosol extinction as a function of wavelength. In order to verify and modify the model, measurements were made with a transmissometer over a horizontal measuring path. The equipment was in operation for 15 months, automatically recording every 10th minute both the atmospheric attenuation in 15 bands in the 0.5 to 14.0 μ m range and the measurements taken from a number of

Aerosol extinction under different weather situations was calculated by Mie theory, using an aerosol model based on dry particles. The size distribution of particles and their refractive index were matched to the actual atmospheric humidity by means of a build-up factor r/r_0 , which is a function of relative humidity.

The report shows that particle concentration in different size ranges has a dominant effect on the relation between aerosol transmission in the IR band and meteorological visibility. Variations in atmospheric humidity affect aerosol extinction for the most part through modification of the size distribution, and to a lesser extent by variation of the refractive index.

FOA Reprints 1979/80:19.

- (173) FOA Report B 30036-E1
 A data structure for a raster map database (in English)
 Roger L.I. Cederberg

An increasing demand for geographical information in the public, private and military sectors has stimulated progress with regard to the automatic collection, storage, analysis and display of geographical databases. A large part of the costs of these systems can be attributed to the digitalisation and coding of the input data. A method is suggested for the storage of binary original data. This method affords high storage efficiency, and data can be accessed in both the raster and vector modes.

Delivered at the Fourth International Symposium on Computer-assisted Cartography, 4-8 November 1979, Reston, Virginia, USA.

FOA Reprints 1979/80:23.

- (174) FOA Report C 30181-E1
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meteorological sensors. Aerosol extinction was obtained by subtracting the water vapour extinction, as calculated from measured meteorological data by the *LOWTRAN* program, from the measured values for extinction.

Analysis of the experimental data exhibits a distinct diurnal variation in aerosol extinction, mainly related to variations in relative humidity. Over a longer period the influence due to varying particle concentration in air masses of different origins becomes distinctly noticeable. The measurements also show characteristic differences between different air masses or atmospheric trajectories as functions of wavelength and humidity, in agreement with theoretical model calculations.

- (176) FOA Report C 30185-E1, E2, E3
Underwater communication. FOA-STU project 4 - Marine engineering
Lars Göttherström *et al* April 1980

The report summarises the technical conditions for underwater communication by acoustic, optical and radio systems. The performance is assessed for different methods of transmission and for different assumptions as to the water environment. In the context of technical possibilities, for the communication requirements in various systems for underwater applications and their practical feasibility, a number of projects are recommended for development.

- (177) FOA Report C 30190-E1
Optical aids to navigation in Arctic waters. Field trials on a voyage to Marmorilik in Greenland
Mats Eriksson and Hans P. Palenius April 1980

The Institute of Optical Techniques of FOA 3 was represented by Mats Eriksson on a voyage in MV Thuleland from England to the mining township of Marmorilik in Greenland. The object was to test optical instruments which had been previously tested as navigational aids.

The field trial, which should be regarded as a preliminary study, showed among other things that the use of image intensifiers makes it possible to detect and identify icebergs under the darkest conditions of illumination considerably earlier than when using the traditional binoculars.

- (178) FOA Report C 30191-E1
PIXLIB on PDP-11/34: Systems documentation. A user-oriented tool for layered imagery handling (in English)
S. Ingvar Åkerblom April 1980

This is a documentation of the *PIXLIB* library of subroutines, developed for the interactive processing of multi-layered image data on the PDP-11/34 computer in FOA 820.

The reporting date is 25 April 1980 and correction, amendment or addition included later will be included in the continuously updated and complete documentation which is available from the *PIXLIB* source code archive in FOA 820.

- (179) FOA Report C 30192-E1
A survey of sporadic E layer, its occurrence and cause
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This Report is a compilation of selected information on the sporadic E layer (E_s). It is meant as an introduction to an investigation of the effect of E_s on SW communication systems.

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E2 Communications

(180) FOA Report C 30187-E2
 Data obtained in radiowave propagation experiments on the path Kiruna-Stockholm
 (in English)
 Mats Bröms and others May 1980

The report gives an account of information obtained from experiments in radio
 wave propagation in the short-wave band over the Kiruna-Stockholm measuring path, with a
 brief description of the equipment.

See also (171) and (176).

E3 Guidance, navigation and target identification

(181) FOA Report C 20357-E3
CONDIS - a development of the simulation package *COMBINEDSIMULATION*
 Lennart Måansson May 1980

This Report describes some developments of the simulation package *COMBINEDSIMULATION* (Keld Helsgaun, Roskilde University, Denmark).

COMBINEDSIMULATION is a Simula-class intended for simulation of dynamic systems in an environment with discontinuous variations of equations of state and differential equations. This class also contains facilities for solving ordinary differential equations by means of numerical integration. The discontinuous variations of state and differential equations can be planned using normal concepts from *SIMULATION*, which means that complicated event-controlled simulations can be performed.

The main section of the research has resulted in a Simula class designated *CONDIS*.

CONDIS is intended for use on the DEC-10 system at the Stockholm Computer Centre QZ, and employs some of its library routines.

CONDIS differs from *COMBINEDSIMULATION* chiefly in two respects. Firstly a new alternative integration method has been introduced, which is a 4th-order predictor-corrector method with detection of discontinuities, and secondly *CONDIS* incorporates a facility by which, after the program has detected certain errors, it can study and vary the parameters in order if possible to be able to resume operation.

(182) FOA Report C 30186-E3
 Positional errors in hydroacoustic navigation
 Lars Göttherström April 1980

The main section of the report is devoted to navigational errors caused by the propagation of hydroacoustic waves and its anomalies. The effect of noise and interference is also studied. Estimates are provided of the rms error for distance and bearing as a function of a number of parameters such as the s/n ratio, filter bandwidth, pulse width, beam width, wavelength, the geometrical dimensions of hydrophone groups, the distance from transmitter to receiver, etc.

The report concludes with a discussion of the orders of magnitude for different types of positional error, and recommends measures for the limitation of errors.

See also (171), (172), (175) and (176).

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E4 Countermeasures, including signal interception and technical intelligence

(183) FOA Report C 30188-E4
 The laser radar equation
 Erik Daniels

April 1980

An expression is derived for the signal/noise ratio in the coherent detection of laser returns from targets at different distances. Numerical examples are given, based on the CO₂ laser.

(184) FOA Report 30189-E4
 'Electronic warfare systems and technology', Conference held in Washington, March 1980
 Hans Bergdal

April 1980

This is a brief account of the most interesting papers together with some of the pictures shown. The future prospects which were brought out during the conference can be summarised as follows:

- Increased use of C³-CM.
- Airborne early-warning and ESM equipment for ships provides capability in a dense signals environment.
- Increased use of off-board ECM for ships' protection.
- Signal interception and intelligence systems using VHSIC will, it is hoped, restore the balance of power between NATO and the Warsaw Pact.

F VEHICULAR AND SPACECRAFT TECHNOLOGYF9 Materials

(185) FOA Report C 20354-F9
 Effect of humidity and temperature on carbon-fibre epoxy composites
 Elise Halloff

May 1980

The effect of humidity on the properties of carbon-fibre composites has been demonstrated by an investigation of three actual carbon-fibre composites made respectively from Narmco 5208, Hercules 3501 and Fibredux 914C prepeg. Records have been made of the increase in weight of composites as a function of the exposure time for given conditions of exposure and pre-treatment, showing that moisture absorption increases with the exposure temperature and relative humidity. Fibredux 914C also differs chemically from the other composites in that the effect of heat treatment and temperature shock (in its prehistory) are of lesser importance. The effect of moisture on the shearing strength, determined at 70-75°C, for Narmco 5208 and Hercules 3501 exhibits fairly similar tendencies, in that the shearing strength decreases with increasing quantities of absorbed water. This reduction, which varies between a few percent up to about 30%, is also affected by absorbed water to some appreciable extent in the prehistory of the material. With Fibredux 914C the shearing strength increases with the absorption of small quantities of water, only to decrease with the absorption of additional water.

H HUMAN ENVIRONMENTH1 Investigations, future projections

(186) FOA Report C 55038-H1
 Exemption from military service on psychiatric grounds - some consequences for personal perception
 Gerry Larsson and Bengt Starrin

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- (187) FOA Report C 55039-HI
Manpower wastage from military service - analysis and summary of a current behavioural study and results of research
Gerry Larsson May 1980

The purpose of this Report is to provide a summary of existing results in behavioural science concerning wastage from national service. The introduction sets out the various types of wastage, followed by wastage on the grounds of diagnosed psychiatric illness. The relevance of this diagnosis is discussed, as certain studies have indicated that many Defence personnel subjected to psychiatric diagnosis have received it on scientifically dubious grounds. The reasons for wastage from national service are analysed. Drop-outs during basic training are thought to be mainly due to factors at the group and organisation level, *eg* poor relations, unit location far from the home district etc. The results of various measures adopted to reduce the number of national service drop-outs are discussed. The greatest effect of these consists of recommendations from a senior military level as to the desirable rate of drop-outs in recent years. The consequences of national service drop-outs are examined from the following points of view: military defence, types of individuals who drop out, the services as a sector of society and psychiatry in the Defence services. Apart from these standpoints, the report concludes with a summary of current research and the need for future research into the problem of national service drop-outs.

- (188) FOA Report C 60006-HI
Theoretical analyses of certain problems in predictive science
Jan Agrell May 1980

The report begins by discussing the constraints which predictive science in particular must attempt to overcome. Attention is then turned to the possibilities of making predictions, with illustrations in the context of the situation in the fields of the astronomical, climatological, biological and social sciences. Special attention is next paid to what are termed discrete events and the possibility of predicting them by means of their degree of probability. Finally against the background of a successive projection of the development of population in Sweden, an outline is given of a computer-based experiment in prediction in this field, using different series of variables derived from official Swedish statistics dating from the 1750s onward.

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H3 Environmental extremes

(189)

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Biochemical effects altering seizure mechanisms of acute oxygen poisoning
Bengt Segerbo (in English)

Academic thesis, 16 May 1980.

H6 Individual and group efficiency

(190)

FOA Report B 54013-H6

Vegetable extract as a protection against disease-bearing insects
W. Thorsell and others

Continuing developments in biology require, among other things, that new control methods should be devised as a protection from, *eg* disease-bearing insects. As part of this activity we are studying new synthetic products. While testing them in the field we have noticed a certain effectiveness in a number of natural products (Thorsell *et al*, 1978). This article describes some experiments with hydrophilic and lipophilic extracts of camomile, tomato, rosemary, marsh tea and bog myrtle, with regard to their effects on mosquitoes, lice and flies.

Offprint from Ent. Tidskrift (1979), 100, 138-141.

FOA Reprints 1979/80:22.

(191)

FOA Report B 57014-H6, H7

Changes in lipoprotein-lipase activity and lipid stores in human skeletal muscle with prolonged heavy exercise (in English)
Hans Lithell and others

Lipoprotein-lipase (LPL) activity and the quantity of triglycerides (TG) stored intracellularly were determined from muscle biopsies from seven volunteers, before and after a ski run of 85 km. The store of TG before the run was five times higher in slow than in fast muscle fibres. LPL activity increased and the store of TG in slow muscle fibres decreased in the course of the run. The most well-trained skiers had the highest store of TG before the run, and their store was reduced during the run more than the store of TG in the less well-trained. In the most well-trained skiers LPL activity increased only slightly, whereas a sixfold increase was observed in the least well-trained subjects. The higher LPL activity exhibited by the less well-trained after the run indicates a higher uptake of fatty acids from the bloodstream compared with the most well-trained skiers.

Offprint from Acta physiol. scand. (1979), 107, 257-261.

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FOA Report B 57015-H6

EMG frequency spectrum, muscle structure and fatigue during dynamic contractions in man (in English)
Paavo Komi and Per Tesch

Fatigue of the thigh muscles was studied in fresh, physically well-trained students. The variation in muscular power due to repeated maximum knee extensions at a constant angular speed ($180^\circ \times s^{-1}$, or about 30% of the optimum angular speed of the muscle) was taken as an expression of the degree of fatigue. Muscular force was recorded by means of an isokinetic strength measuring apparatus.

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In order to study the quantitative and qualitative changes in EMG (electromyography), integrated EMG (IEMG) and the mean power frequency (MPF) of EMG were analysed. Briefly, MPF describes the frequency with which the majority of motor units, activated during a contraction, are discharged.

Individuals with a high percentage of fast contracting (FT) muscle fibres in *m. vastus lateralis* exhibited a higher maximum muscle power and lower stamina than those having a large amount of slowly contracting (ST) muscle fibres. IEMG significantly decreased ($p < 0.01$) during 100 contractions in a group of individuals with a high percentage of FT fibres, whereas a small (non-significant) reduction in IEMG occurred in those having muscles with a large proportion of ST fibres. The MPF decreased by 26% ($p < 0.001$) in persons having a high percentage of FT fibres, while those having a high percentage of ST fibres exhibited only a small (non-significant) decrease.

To judge by the results, a relation appears to exist between acute deterioration of muscular function and qualitative changes in the recovery pattern of a motor unit. These changes take place earlier and to a greater extent in muscles dominated by FT fibres than in those consisting largely of ST fibres.

Offprint from Eur. J. Appl. Physiol. (1979), 42, 41-50.

FOA Reprints 1979/80:21.

- (193) FOA Report C 57005-H6
Physical efficiency. Short-term information requirements of the National Service Department
Jan Karlsson

- H9 Man and machine systems

- (194) FOA Report C 56022-H9
Real-time simulation on a landscape model. I General description
Kenth Carlsson June 1980

A simulator is presented whose main constituent is a model of an actual stretch of ground. By means of peripheral equipment the landscape model is intended for use in the environmental simulation of experiments on the actual ground.

A two-axial rotary table placed on the floor alongside the landscape model is used as a platform for sighting, observing and weapon equipment. The rotary table records the alignment of the equipment with very good resolution. A laser pointer suspended from the ceiling above the rotary table is used for indicating, e.g. the impact of projectiles on the surface of the model. Propulsion of targets over the surface of the model is done by a stepping motor with associated electronics. A digital computer performs all the computations during a simulation operation, and controls or is controlled by those parts in the simulator which are equipped with electronic components.

Among other things, the existing configuration provides studies of problems in anti-tank warfare.

The report describes one other application, simulated firing at stationary and moving targets with the M/48 grenade-thrower.

Finally some suggestions are offered for development and for other fields of application.

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A two-axial rotary table placed on the floor alongside the landscape model is used as a platform for sighting, observing and weapon equipment. The rotary table records the alignment of the equipment with very good resolution. A laser pointer suspended from the ceiling above the rotary table is used for indicating, e.g. the impact of projectiles on the surface of the model. Propulsion of targets over the surface of the model is done by a stepping motor with associated electronics. A digital computer performs all the computations during a simulation operation, and controls or is controlled by those parts in the simulator which are equipped with electronic components.

Among other things, the existing configuration provides studies of problems in anti-tank warfare.

The report describes one other application, simulated firing at stationary and moving targets with the M/48 grenade-thrower.

Finally some suggestions are offered for development and for other fields of application.

- (195) FOA Report C 58007-H9
 Functional study of diving gauntlets
 John Adolfson and others

March 1980

A study of six ordinary commercial types of diving gauntlets was performed at a depth of 30 m with ten divers, who were tested for manual strength, mobility of fingers and hands and finger sensitivity. Water temperatures varied between 1.7 and 3.7°C, and diving periods between 38 and 58 minutes. No appreciable fall in rectal temperature was observed during the 62 dives. Skin temperature on the hands however fell rapidly as soon as diving began.

Manual strength was considerably reduced, and also mobility and finger sensitivity. The results are discussed in the report, and it has been possible to make certain recommendations. Since neoprene and nylonprene are compressible they lose their heat-insulating power under water. Divers' gauntlets should therefore be made from incompressible material. Hand coverings should also be supplemented by an inner glove of some soft textile with a good heat-insulating ability. These questions should form part of an additional investigation. It is also highly important for gauntlets to be correctly sized to give divers the ability to work with their hands.

M INTERDISCIPLINARY STUDIES AND INVESTIGATIONS

M6 Information systems

- (196) FOA Report C 10053-M6 (H9)
 VIEWDATA interface for arbitrary computer programs
 Jacob Palme

(in English)
 June 1980

This Report describes the central algorithms in a computer program for matching a VDU to any desired application program, not specially written to be suitable for this terminal. The matching program divides input and output data into/out of the application program in a manner suitable to the small and non-extensible screen on the VDU.

- (197) FOA Report C 10152-M6 (H9)
 When does office automation succeed? Report on a symposium
 Jacob Palme

May 1980

This Report is a summary of what was said at an international conference 'International Symposium on Office Automation - Emerging Office Systems: Why some work and others fail'.

Important factors for progress with office automation includes knowledge of the actual requirements of the people who are to use the systems, design of systems so that they satisfy the users' actual requirements, and a system design adapted to the group of users. Many systems are produced with a surprising absence of these apparently self-evident factors. To take one simple example, many people think that secretarial staff spend 50% of their working time in writing, the true value (based on observations) being 20%. And many people think that everyone thinks in the same way as data-processing engineers, at least to judge by the systems they design.

In fact communication with other people is the predominant activity in an office, and an appreciation of this is necessary for office automation to succeed.

Another important element is the view of humanity held by those who design these systems, whether it is 'authoritarian' or 'humanistic'.

It is important to achieve a system of a certain 'critical size' so that the users can take sufficient advantage of their mutual communication.

T CERTAIN MEASURES FOR LIMITATION AND CONTROL OF ARMAMENTS

T1 Seismological multiple stations

(198) FOA Report C 20358-T1

Internal seismological stations for monitoring a comprehensive test ban treaty
(in English)
Ola Dahlman and dans Israelson

June 1980

This Report contains a discussion of the likely application of what are termed local seismological stations which may be set up in the US and Soviet Union for monitoring some future treaty for a comprehensive ban on atomic weapons testing. It considers the technical purposes which might be served by local seismological stations in relation to a worldwide seismological monitoring system for a ban on testing. A description is also given of the American equipment which has been produced for these stations. The report includes a detailed non-technical summary.

T3 Scientific documentation

(199) FOA Report C 10132-T3

Disarmament and development. A bibliographical guide to UN studies
Marie Wängborg

June 1978

The 10th Special Session of the UN General Assembly, which took place in 1978 and was devoted to disarmament, adopted a proposal for the Nordic countries for a UN study of the relationship between disarmament and development.

This Report is an attempt to describe and cite examples of existing available publications on the subject fields with which the UN study will deal. It is intended to be a guide to further studies and research into these and similar questions.

An English version of the report also exists, reference FOA C 10132-T3.

(200) FOA Report C 20355-T3

Accelerator breeders - experience gained on a visit to the USA in autumn 1979
Henri Gourgi

May 1980

Some considerations are reported which emerged from study visits to a number of laboratories in the USA and Canada in October 1979 concerning the conditions for implementing an advanced nuclear energy project on what are termed accelerator breeders. Special attention is also paid to the technical possibilities of modifying the nuclear fuel cycle in order to render it more resistant to proliferation in terms of nuclear warheads.

A PM from 1978 is appended with certain technical commentaries.

X MISCELLANEOUS (in-house projects etc)

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Successful projects. Some specimen types of project
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April 1980

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The report summarises the relevant part of the information assembled by the working party of the group (the authors of the report) during the preparatory stage, and of the opinions put forward in discussions within the group and with a great many of the FOA research staff. This information is of course more extensive than can reasonably be submitted in the form of direct documentation just before the programme begins, and in particular before the Divisional Heads' meeting in autumn 1980. However it forms a fuller and more explanatory background to the views expressed in the FOA projections for Defence research. For anyone wanting a clearer case put for the views expressed in those projections, it may therefore be more valuable to read this more detailed version.

The principle underlying the outline is that Defence research forms a part of two otherwise quite dissimilar social activities, namely overall defence and the scientific community. From both quarters working results and opinions can be derived as to the desirable manner in which to proceed. Both however give rise to constraints. It has been the authors' intention to clarify the requirements and constraints with which Defence research has to work, and the freedom of action or the options available in the future. The reader's guide in section 1 and the detailed table of contents may assist the reader in finding the discussion of any particular subject.

The conclusions drawn - those of the working party and those stated by the authors - are collected in section 8. Section 8.5 contains the working party's view of the objectives of Defence research in January 1980, and these views formed the basis of continued discussions among the Directorate and management of FOA during the winter and spring of 1980. The opinions advanced in section 8 are repeated in the FOA projections (June 1980).

EMERGENCY COUNCIL FOR PSYCHOLOGICAL DEFENCE

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- A study of the exchange of information among the local radio, the public and the public authorities during the snowstorm in Skåne in the new year 1979. The

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